

Serial No. 10/784,886

Attorney Docket No. 11-226

**LISTING OF CLAIMS:**

The following listing of claims replaces all previous versions, and listings of claims in the present application.

1. (Currently amended) An apparatus for detecting a rollover of a vehicle, comprising:  
a ~~first~~ roll angular velocity detector periodically detecting a roll angular velocity of the vehicle at intervals;

a memory unit memorizing ~~a value~~ values of the roll angular velocity periodically detected by the ~~first~~ roll angular velocity detector;

a ~~first~~ predictive angular velocity calculator calculating a predictive value ~~to~~ of the roll angular velocity to be expected ~~when after an elapse of a predetermined period of time elapses,~~  
~~by using a past value on the basis of the values of the roll angular velocity of the vehicle,~~  
including a the past value of the roll angular velocity being memorized in the memory unit; and

a rollover determination unit determining whether or not there is a possibility that the vehicle will make a rollover, on the basis of the predictive value of ~~to~~ the roll angular velocity.

2. (Currently amended) The apparatus according to claim 1, wherein the ~~first~~ predictive angular velocity calculator ~~is~~ configured to use the values ~~to~~ of the roll angular velocity to obtain a derivative of the roll angular velocity and to calculate the predictive value ~~to~~ of the roll angular velocity using a Taylor's expansion of the derivative directed to a time instant ~~when~~ after an elapse of the predetermined period of time ~~elapses~~.

3. (Currently amended) The apparatus according to claim 1, comprising an acquiring unit acquiring a roll angle of the vehicle,

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wherein the rollover determination unit is configured to perform the determination on the basis of a relationship between a value of the roll angle and the predictive value ~~to~~ of the roll angular velocity.

4. (Currently amended) The apparatus according to claim 3, wherein the acquiring unit is formed as either a unit detecting the roll angle of the vehicle or a unit calculating the roll angle of the vehicle by integrating the roll angular velocity.

5. (Currently amended) The apparatus according to claim 3, wherein the rollover determination unit is configured to perform the determination in consideration of a relationship between the value of the roll angle and the ~~value~~ values of the roll angular velocity.

6. (Currently amended) The apparatus according to claim 1, comprising a ~~second~~ predictive angle calculator calculating a predictive value ~~to~~ of the roll angle to be expected at after the elapse of a time instant when the predetermined period of time elapses, by using the predictive value to the roll angular velocity,

wherein the rollover determination unit is configured to perform the determination on the basis of a relationship between the predictive value ~~to~~ of the roll angle and the predictive value ~~to~~ of the roll angular velocity.

7. (Currently amended) The apparatus according to claim 3, wherein the rollover determination unit has a two-dimensional map of which dimensions are ~~consisting of~~ the roll angle and the roll angular velocity ~~serving as two dimensions~~, boundary lines being set on the map to form a first region showing a possibility of a vehicle's rollover and a second region showing no possibility of the vehicle's rollover, and means for performing the determination by

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pointing at a point on the map, the point being defined by both the value of the roll angle and the value of the roll angular velocity.

8. (Currently amended) The apparatus according to claim 7, comprising

- a ~~second~~ lateral acceleration detector detecting a lateral acceleration ~~to be applied on~~ of the vehicle detectable in a lateral direction of the vehicle;
- a ~~third~~ vertical acceleration detector detecting a vertical acceleration ~~to be applied on~~ of the vehicle detectable in a vertical direction of the vehicle;
- a ~~second~~ difference value calculator calculating a difference value of the roll angular velocity using the ~~value~~ values of the roll angular velocity memorized in the memory unit;
- a rollover mode determination unit determining a rollover mode of the vehicle based on at least one of the lateral acceleration, the vertical acceleration, the difference value of the roll angular velocity, and the roll angular velocity; and
- a controlling unit controlling positions of the boundary lines on the map depending on the mode of the rollover determined by the rollover mode determination unit.

9. (Currently amended) The apparatus according to claim 7, comprising

- a ~~second~~ lateral acceleration detector detecting a lateral acceleration ~~to be applied on~~ of the vehicle detectable in a lateral direction of the vehicle; and
- a controlling unit controlling positions of the boundary lines on the map depending on a level of the lateral acceleration detected by the ~~second~~ lateral acceleration detector.

10. (Currently amended) An apparatus for activating occupant protective devices mounted ~~on~~ in a vehicle, the occupant protective devices being plural in number and being mounted on both lateral sides of the vehicle, respectively, the apparatus comprising:

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a roll angular velocity detector periodically detecting a roll angular velocity of the vehicle;

an acquiring unit periodically acquiring a roll angle of the vehicle;

a rollover determination unit performing a rollover determination whether or not there is a possibility that the vehicle will make a rollover, on the basis of a value of the roll angle and a value of the roll angular velocity;

an acceleration detector periodically detecting a lateral acceleration ~~of to be applied to the~~ vehicle detectable in a lateral direction of the vehicle;

a side-impact determination unit performing a first side-impact determination determining using a value of the detected lateral acceleration to determine whether or not there is a side impact applied on the vehicle, ~~on the basis of a value of the lateral acceleration detected by the acceleration detector~~ and a second side-impact determination using the value of the detected lateral acceleration to determine whether or not the side impact occur on which lateral side of the vehicle the side impact occurs ~~on the basis of the value of the lateral acceleration~~; and

an activation control unit controlling activation of the occupant protective devices, every device mounted on each lateral side of the vehicle, using results determined by ~~at least one of~~ both the rollover determination unit and the side-impact determination unit.

11. (Currently amended) The apparatus according to claim 10, wherein the acquiring unit is formed as either a unit detecting the roll angle of the vehicle or a unit calculating the roll angle of the vehicle by integrating the roll angular velocity.

12. (Original) The apparatus according to claim 10, wherein the activation control unit is configured

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to control one or more devices of the plural occupant protective devices on the basis of a result of the first side-impact determination, the one or more occupant protective devices being mounted on a collision side of the vehicle decided by the second side-impact determination and

to control remaining one or more devices of the plural occupant protective devices on the basis of a result of the rollover determination, the one or more remaining occupant protective devices being mounted on a non-collision side of the vehicle decided by the second side-impact determination.

13. (Currently amended) The apparatus according to claim 12, wherein

the rollover determination unit has a two-dimensional map of which two dimensions are ~~consisting of~~ the roll angle and the roll angular velocity ~~serving as two dimensions~~, boundary lines being set on the map to form a first region showing a possibility of a vehicle's rollover and a second region showing no possibility of the vehicle's rollover, and means for performing the rollover determination by pointing at a point on the map, the point being defined by both the value of the roll angle and the value of the roll angular velocity and

the side-impact determination unit is configured to perform the first side-impact determination using a magnitude relation between the value of the lateral acceleration and a predetermined acceleration threshold ~~therein~~.

14. (Currently amended) The according to claim 10, wherein the activation control unit is configured

to control one or more devices of the plural occupant protective devices on the basis of ~~at least one of~~ both of a result of the first side-impact determination and a result of the rollover determination, the one or more occupant protective devices being mounted on a collision side of the vehicle decided by the second side-impact determination and

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to control one or more remaining devices of the plural occupant protective devices on the basis of a result of the rollover determination, the one or more remaining occupant protective devices being mounted on a non-collision side of the vehicle decided by the second side-impact determination.

15. (Currently amended) The apparatus according to claim 14, wherein the rollover determination unit has a two-dimensional map of which two dimensions are ~~consisting of~~ the roll angle and the roll angular velocity ~~serving as two dimensions~~, boundary lines being set on the map to form a first region showing a possibility of a vehicle's rollover and a second region showing no possibility of the vehicle's rollover, and means for performing the rollover determination by pointing at a point on the map, the point being defined by both the value of the roll angle and the value of the roll angular velocity and

the side-impact determination unit is configured to perform the first side-impact determination using a magnitude relation between the value of the lateral acceleration and a predetermined acceleration threshold thereto.

16. (Currently amended) The apparatus according to claim 15, wherein the boundary lines on the map are adjustable ~~to~~ toward positions closer to an origin of the map; and

~~the acceleration threshold to the lateral acceleration~~ is adjustable ~~to be lowered~~.

17. (Currently amended) The apparatus according to claim 15, wherein the rollover determination unit, including means for performing a further determination determining a magnitude relation between a difference ~~value~~ of a current value of the roll angular velocity derived from a value thereof of the roll angular velocity detected last time and a predetermined

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value, is configured to ~~make~~ cause the rollover determination performing means to perform the rollover determination additionally using a result performed by the further determination.

18. (Currently amended) The apparatus according to claim 15, wherein the boundary lines on the map are adjustable to positions on the map in a direction departing from an origin of the map.

19. (Currently amended) The apparatus according to claim 10, comprising a rollover mode determination unit determining whether or not a mode of the rollover is a trip-over, based on a ~~generation~~ generating direction of the lateral acceleration and a ~~rotation~~ rotating direction of the roll angular velocity,

wherein the activation control unit, when the rollover mode determination unit determines that the mode of the rollover is the trip-over, controls the activation of the occupant protective device mounted on a non-collision lateral side of the vehicle on the basis of the result determined by the rollover determination unit, the non-collision lateral side being determined by the second side-impact determination.

20. (Currently amended) The apparatus according to claim 10, wherein the occupant protective devices include a side airbag device to be inflated and deployed on an inside wall of a cabin of the vehicle and the activation control unit controls the activation of the side airbag device mounted on a non-collision lateral side of the vehicle ~~on the basis of~~ in response to the result determined by the rollover determination unit, the non-collision lateral side being determined by the second side-impact determination.

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